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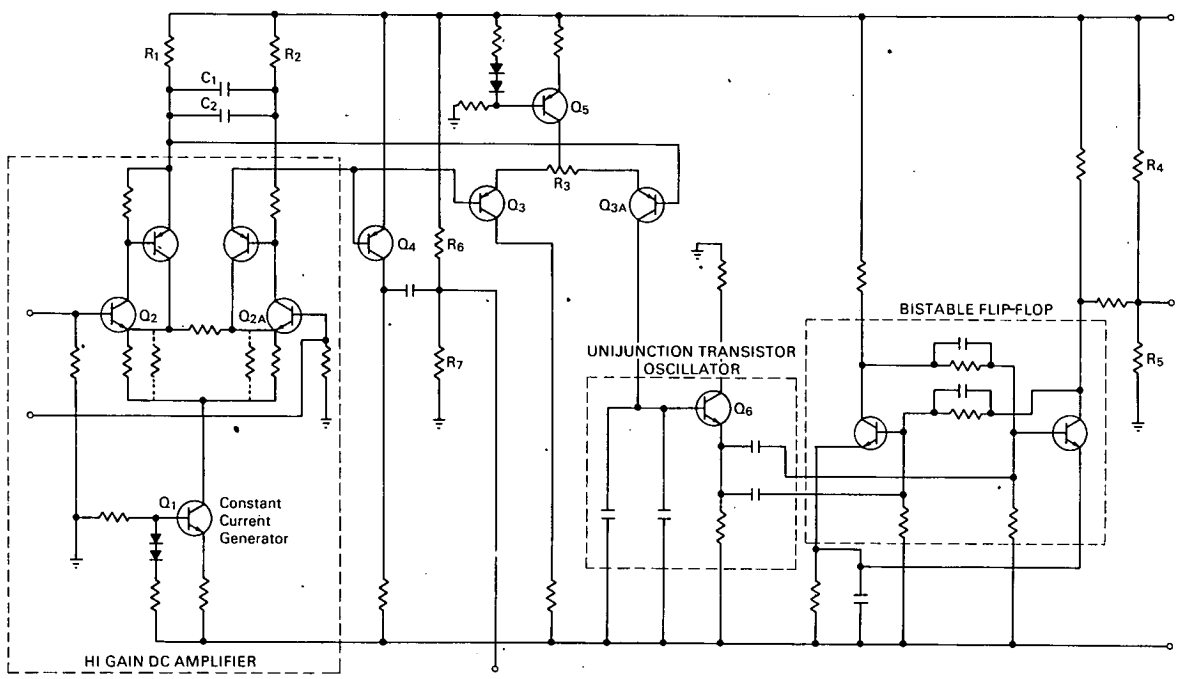
NASA TECH BRIEF

Blood Pressure Reprogramming Adapter Assists Signal Recording



The blood pressure signal contains two components that are mixed together in telemetry applications, a dc pressure signal and an ac (36 cps) Korotkoff sounds signal. Most tape recorders are incapable of recording the composite signal on the same channel because of their frequency response limitations.

A blood pressure reprogramming adapter has been designed to separate the two signals so that the Korotkoff sounds are recorded on one channel as received while the dc pressure signal is converted to FM and recorded on a second channel. This circuitry has the advantage over other conversion devices such as rc multivibrators, square loop transformer oscillators, and voltage controlled oscillators, in its inherent linearity and low power drain.

Basically, the circuit consists of a differential dc amplifier that varies the output of a constant current generator that in turn varies the frequency of a unijunction transistor oscillator. Output of the oscillator is fed to a bistable flip-flop that produces a symmetrical output. The first five transistors form a high gain dc amplifier with Q_1 acting as a constant current source. Transistors Q_2 and Q_{2A} form a matched pair of NPN silicon planar transistors while Q_3 and

(continued overleaf)

Q_{3A} form a matched pair of PNP planar transistors and these are so connected that they provide high current gain and low temperature drift. Capacitors C_1 and C_2 across R_1 and R_2 limit the ac gain at 36 cps to approximately 1.6, which provides adequate signal while preventing interference to the oscillator. Transistor Q_4 and capacitor C_3 remove the Korotkoff sounds from the pressure ramp and apply them to output 1. Transistor Q_{3A} forms the second stage of the dc amplifier with Q_5 acting as its current source. Current in Q_{3A} is set by adjusting R_3 with the input shorted. The repetition rate of Q_6 is directly proportional to the current in Q_{3A} which, once set, is controlled by the differential voltage at its bases, originally determined by the input voltage. Output from Q_6 is in the form of sharp pulses which the tape recorder is unable to handle; consequently, the pulses are used to trigger the bistable flip-flop. Output of the bistable is a symmetrical square wave whose frequency is one half the unijunction oscillator frequency. Resistors R_4, R_5, R_6, and R_7 attenuate this signal and provide the correct bias for compatibility with the tape recorder response.

Notes:

1. This circuitry draws only 2 ma from the −10v supply and 1 ma from the +10v supply and is absolutely linear from 10 cps to 100 cps.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas 77058
   Reference: B67-10475

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

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